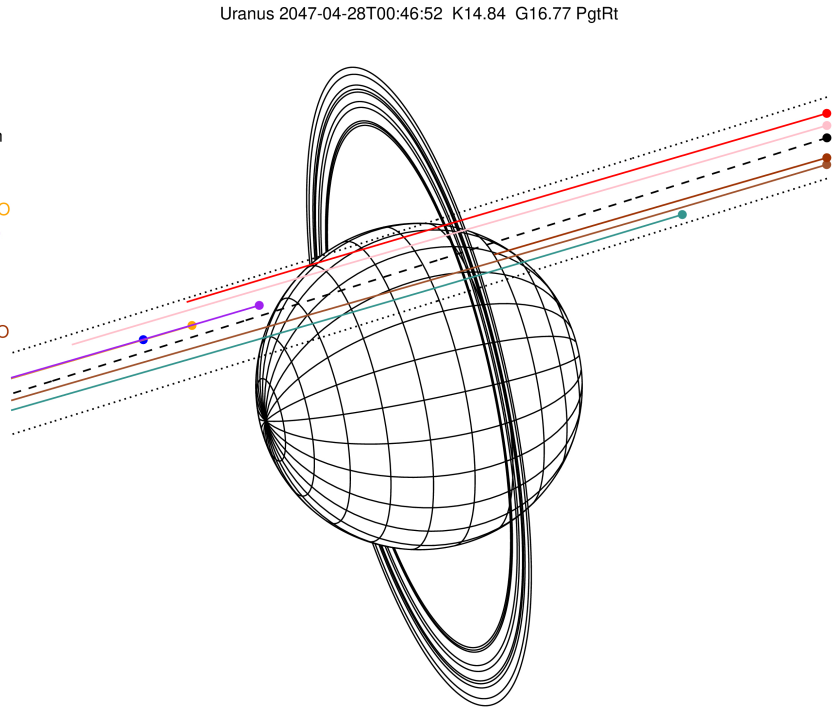
Stellar occultation prediction by rfrench@wellesley.edu Sun Jun 25 02:46:33 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2047-04-28T00:46:52.330
Event type : PgtRt
: Uranus occs: geocentric, topocentric
: Ring occs: topocentric, not geoecetric
Gaia source ID : 3880562463003595648
2Mass ID (if available) : 10154570+1137071

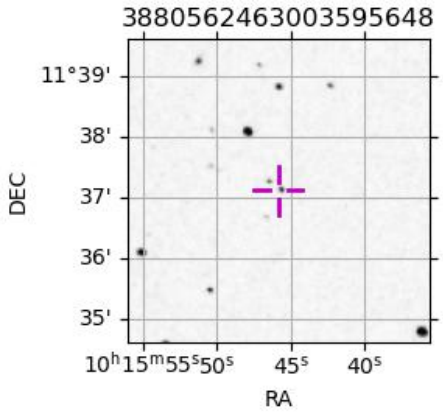
ICRS Star Coord at Epoch: 10h 15m 45.72369s +11:37:07.10595s
RUWE (>1.4 is poor) : 0.97
K magnitude : 14.839
G magnitude : 16.765
RP magnitude : 16.138
BP magnitude : 17.221
DUPflag : 0
Distance (au) : 17.869
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : -5.65
Sun-Target sep (deg) : 114.61
Sun-Moon sep (deg) : 83.51
B (ring opening deg) : 15.74
PA of pole (deg) : 102.69

| # | a(km) | ring |
|---|---|---|
| 1 | 41837.2 | 6 |
| 2 | 42235.0 | 5 |
| 3 | 42571.2 | 4 |
| 4 | 44718.5 | alpha |
| 5 | 45661.1 | beta |
| 6 | 47176.1 | eta |
| 7 | 47626.3 | gamma |
| 8 | 48300.3 | delta |
| 9 | 50026.7 | lambda |
| 10 | 51149.4 | epsilon |

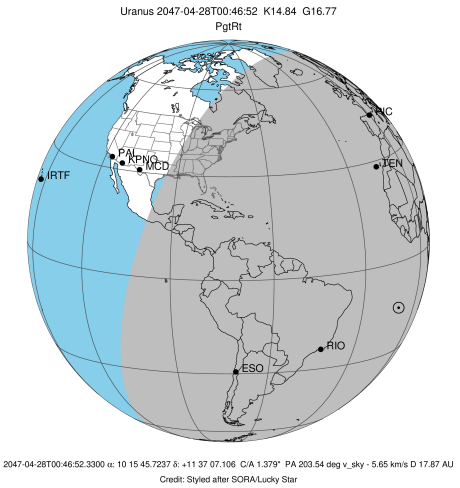

Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

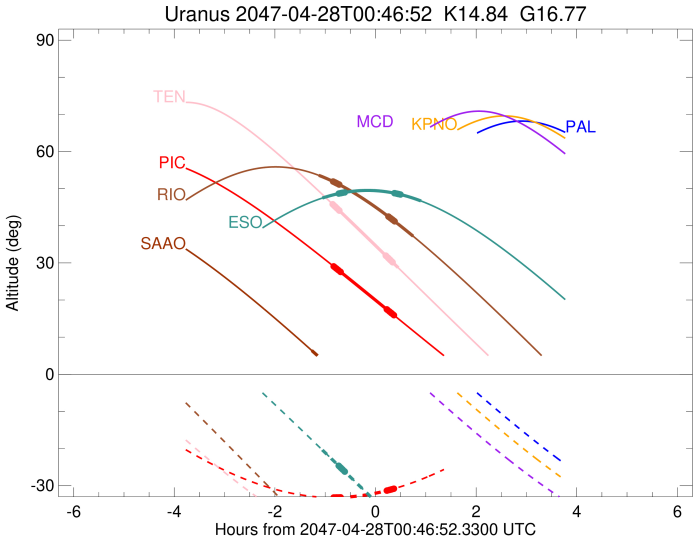
| Obs | Location | lat | Elon | Rings I | Planet | Rings E | Observed Events Interval | OEcode |
|---|---|---|---|---|---|---|---|---|
| PIC | Pic du Midi | 42.9 | 0.1 | +++++++++ | + + | | APR 27 23:56 - APR 28 01:08 | PieRin |
| PAL | Palomar Mt (200") | 33.4 | 243.1 | | | | | PnnRnn |
| PMO | Purple Mtn Obs. Nanki | 32.1 | 118.8 | | | | | PnnRnn |
| KPNO | Kitt Peak Natl Obs | 32.0 | 248.4 | | | | | PnnRnn |
| MCD | McDonald Obs. 2.7m | 30.7 | 256.0 | | | | | PnnRnn |
| TEN | Teide Obs./Tenerife | 28.3 | 343.5 | + | + + | | APR 27 23:55 - APR 28 01:13 | PieRin |
| IRTF | Mauna Kea/IRTF | 19.8 | 204.5 | | | | | PnnRnn |
| KAV | Kavalur Observatory | 12.6 | 78.8 | | | | | PnnRnn |
| RIO | Rio de Janeiro | -22.9 | 316.8 | | + + | | APR 27 23:39 - APR 28 01:31 | PieRnn |
| ESO | European Southern Obs | -29.3 | 289.3 | | + + | | APR 27 23:43 - APR 28 01:40 | PieRnn |
| AAT | Siding Spring (AAT) | -31.3 | 149.1 | | | | | PnnRnn |
| SAAO | So. Afr. Astro. Obs. | -32.4 | 20.8 | | + | | APR 27 23:30 - APR 27 23:30 | PinRnn |
| MSO | Mt. Stromlo Observato | -35.3 | 149.0 | | | | | PnnRnn |



Uranus_2047-04-28T00_46_52.3300_PIC.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:17:14 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2047-04-28T00:36:49.600
Event type : PgtRt
: Uranus occs: geocentric, topocentric
: Ring occs: topocentric, not geoecetric
Observer code : PIC
Location : Pic du Midi
Latitude (deg) : 42.93656
E. Longitude (deg) : 0.14231
Altitude (km) : 2.890
Gaia source ID : 3880562463003595648
2Mass ID (if available) : 10154570+1137071
ICRS Star Coord at Epoch: 10h 15m 45.72369s +11:37:07.10595s
RUWE (>1.4 is poor) : 0.97
K magnitude : 14.839
G magnitude : 16.765
RP magnitude : 16.138
BP magnitude : 17.221
DUPflag : 0
Distance (au) : 17.869
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : -5.65
Sun-Target sep (deg) : 114.61
Sun-Moon sep (deg) : 83.86
B (ring opening deg) : 15.74
PA of pole (deg) : 102.69
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.781
C/A sky separation (km) : 23086.4
NAIF SPICE kernels : RAJobs_U111+rgf15.spk
URKALLv1.spk
ura111.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.ura111.bsp
ura161.bsp
vgr2.ura161.bsp
peph.ura160.bsp
earthstns_itrf93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk



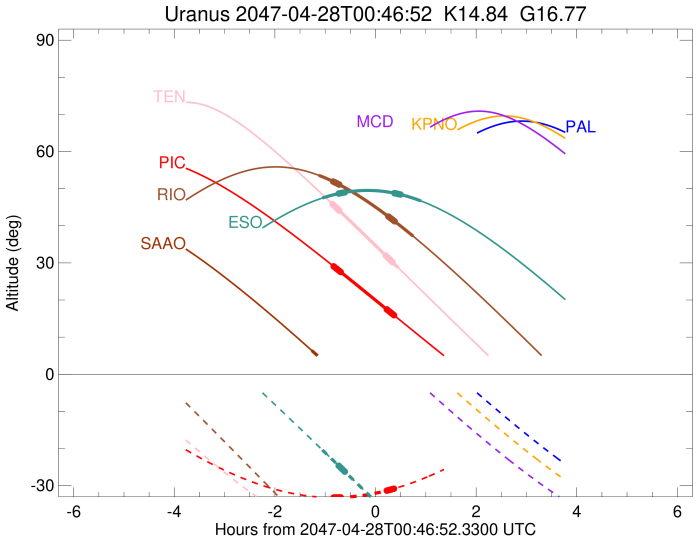




b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---|---|---|---|---|---|---|---|---|---|
| epsilon | I | 2047-04-27T23:56:38.478 | | 29.13 | -33.19 | 51533.62 | -19.11 | | |
| lambda | I | 2047-04-27T23:57:57.740 | | 28.89 | -33.19 | 50026.71 | -18.93 | | |
| delta | I | 2047-04-27T23:59:29.390 | | 28.61 | -33.19 | 48300.35 | -18.74 | | |
| gamma | I | 2047-04-28T00:00:05.713 | | 28.50 | -33.19 | 47621.28 | -18.65 | | |
| eta | I | 2047-04-28T00:00:29.614 | | 28.43 | -33.19 | 47176.12 | -18.60 | | |
| beta | I | 2047-04-28T00:01:52.724 | | 28.18 | -33.18 | 45642.33 | -18.39 | | |
| alpha | I | 2047-04-28T00:02:43.134 | | 28.03 | -33.18 | 44738.07 | -18.25 | | |
| 4 | I | 2047-04-28T00:04:46.708 | | 27.66 | -33.16 | 42542.72 | -17.91 | | |
| 5 | I | 2047-04-28T00:04:56.075 | | 27.63 | -33.16 | 42315.09 | -17.81 | | |
| 6 | I | 2047-04-28T00:05:31.280 | b | 27.52 | -33.16 | 41806.73 | -17.77 | | |
| Uranus | I | 2047-04-28T00:05:07.162 | | 27.59 | -33.16 | 25553.17 | | -20.79 | -21.68 |
| Uranus | E | 2047-04-28T01:08:48.767 | | 15.92 | -30.83 | 25548.83 | | 28.00 | 29.11 |
| 6 | E | 2047-04-28T01:00:16.047 | b | 17.50 | -31.35 | 41821.64 | 17.49 | | |
| 5 | E | 2047-04-28T01:00:43.566 | b | 17.41 | -31.32 | 42198.42 | 17.52 | | |
| 4 | E | 2047-04-28T01:00:53.924 | b | 17.38 | -31.31 | 42550.59 | 17.62 | | |
| alpha | E | 2047-04-28T01:02:58.206 | b | 17.00 | -31.19 | 44684.92 | 17.93 | | |
| beta | E | 2047-04-28T01:03:51.119 | b | 16.84 | -31.14 | 45664.09 | 18.06 | | |
| eta | E | 2047-04-28T01:05:15.082 | b | 16.58 | -31.05 | 47176.12 | 18.24 | | |
| gamma | E | 2047-04-28T01:05:39.949 | b | 16.50 | -31.03 | 47630.45 | 18.30 | | |
| delta | E | 2047-04-28T01:06:16.488 | b | 16.39 | -30.99 | 48300.35 | 18.37 | | |
| lambda | E | 2047-04-28T01:07:50.007 | b | 16.11 | -30.89 | 50026.71 | 18.55 | | |
| epsilon | E | 2047-04-28T01:08:43.632 | b | 15.94 | -30.84 | 51023.73 | 18.71 | | |

Uranus_2047-04-28T00_46_52.3300_TEN.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:28:00 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2047-04-28T00:34:43.060
Event type : PgtRt
: Uranus occs: geocentric, topocentric
: Ring occs: topocentric, not geoecetric
Observer code : TEN
Location : Teide Obs./Tenerife
Latitude (deg) : 28.30050
E. Longitude (deg) : 343.48909
Altitude (km) : 2.395
Gaia source ID : 3880562463003595648
2Mass ID (if available) : 10154570+1137071
ICRS Star Coord at Epoch: 10h 15m 45.72369s +11:37:07.10595s
RUWE (>1.4 is poor) : 0.97
K magnitude : 14.839
G magnitude : 16.765
RP magnitude : 16.138
BP magnitude : 17.221
DUPflag : 0
Distance (au) : 17.869
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : -5.65
Sun-Target sep (deg) : 114.61
Sun-Moon sep (deg) : 84.07
B (ring opening deg) : 15.74
PA of pole (deg) : 102.69
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.663
C/A sky separation (km) : 21551.2
NAIF SPICE kernels : RAJobs_U111+rgf15.spk
URKALLv1.spk
ura111.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.ura111.bsp
ura161.bsp
vgr2.ura161.bsp
peph.ura160.bsp
earthstns_itrf93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk

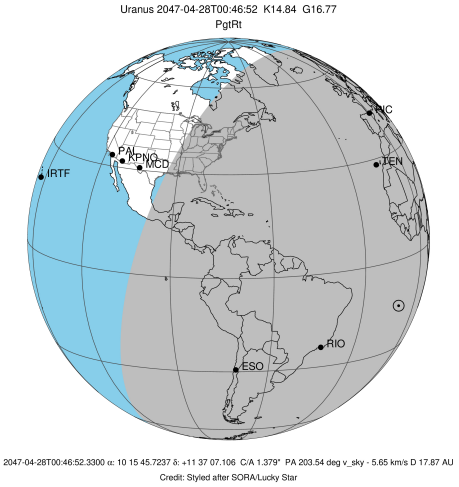



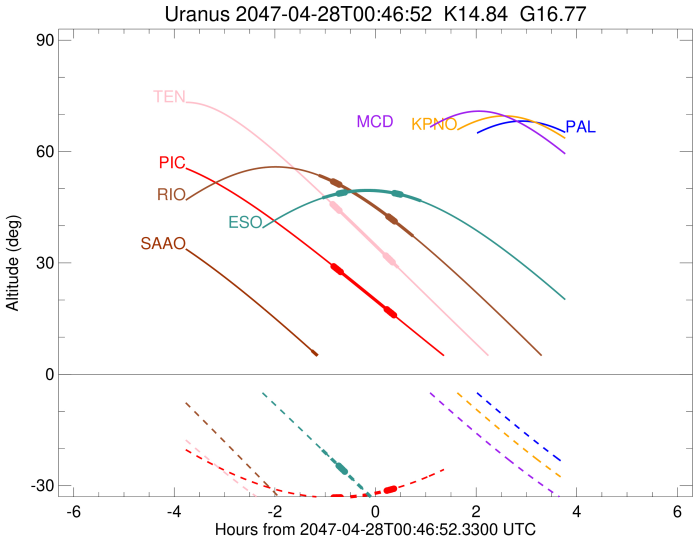

b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---|---|---|---|---|---|---|---|---|---|
| epsilon | I | 2047-04-27T23:55:29.026 | | 45.87 | -44.71 | 51528.78 | -19.85 | | |
| lambda | I | 2047-04-27T23:56:45.062 | b | 45.60 | -44.82 | 50026.71 | -19.69 | | |
| delta | I | 2047-04-27T23:58:13.135 | b | 45.28 | -44.95 | 48300.35 | -19.51 | | |
| gamma | I | 2047-04-27T23:58:48.002 | b | 45.16 | -44.99 | 47621.22 | -19.44 | | |
| eta | I | 2047-04-27T23:59:10.926 | b | 45.07 | -45.03 | 47176.12 | -19.39 | | |
| beta | I | 2047-04-28T00:00:30.571 | b | 44.79 | -45.14 | 45642.63 | -19.21 | | |
| alpha | I | 2047-04-28T00:01:18.689 | b | 44.61 | -45.20 | 44739.21 | -19.09 | | |
| 4 | I | 2047-04-28T00:03:16.817 | b | 44.19 | -45.36 | 42544.31 | -18.80 | | |
| 5 | I | 2047-04-28T00:03:25.346 | b | 44.16 | -45.37 | 42315.24 | -18.70 | | |
| 6 | I | 2047-04-28T00:03:59.129 | b | 44.04 | -45.41 | 41808.11 | -18.68 | | |
| Uranus | I | 2047-04-27T23:55:55.153 | | 45.78 | -44.75 | 25548.89 | | -27.91 | -29.02 |
| Uranus | E | 2047-04-28T01:13:57.784 | | 28.69 | -47.71 | 25544.29 | | 34.37 | 35.61 |
| 6 | E | 2047-04-28T00:59:02.995 | b | 31.98 | -47.78 | 41823.31 | 18.38 | | |
| 5 | E | 2047-04-28T00:59:29.288 | b | 31.89 | -47.78 | 42195.50 | 18.39 | | |
| 4 | E | 2047-04-28T00:59:39.202 | b | 31.85 | -47.78 | 42552.25 | 18.49 | | |
| alpha | E | 2047-04-28T01:01:37.862 | b | 31.41 | -47.79 | 44684.77 | 18.75 | | |
| beta | E | 2047-04-28T01:02:28.584 | b | 31.23 | -47.79 | 45664.82 | 18.86 | | |
| eta | E | 2047-04-28T01:03:49.013 | b | 30.93 | -47.79 | 47176.12 | 19.02 | | |
| gamma | E | 2047-04-28T01:04:12.876 | b | 30.84 | -47.79 | 47630.56 | 19.07 | | |
| delta | E | 2047-04-28T01:04:47.946 | b | 30.72 | -47.79 | 48300.35 | 19.13 | | |
| lambda | E | 2047-04-28T01:06:17.825 | b | 30.39 | -47.79 | 50026.71 | 19.28 | | |
| epsilon | E | 2047-04-28T01:07:08.797 | b | 30.20 | -47.78 | 51011.57 | 19.43 | | |

Uranus_2047-04-28T00_46_52.3300_RIO.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:34:20 2023

```
target                  : Uranus
target radius (km)      :  25559.00
C/A epoch               : 2047-04-28T00:35:09.370
Event type              : PgtRt
: Uranus occs: geocentric, topocentric
: Ring occs: topocentric, not geoecetric
Observer code           : RIO
Location                : Rio de Janeiro
Latitude (deg)          : -22.89506
E. Longitude (deg)      : 316.77708
Altitude (km)           :   0.033
Gaia source ID          : 3880562463003595648
2Mass ID (if available) : 10154570+1137071
ICRS Star Coord at Epoch: 10h 15m 45.72369s +11:37:07.10595s
RUWE (>1.4 is poor)     :   0.97
K magnitude             : 14.839
G magnitude             : 16.765
RP magnitude            : 16.138
BP magnitude            : 17.221
DUPflag                 : 0
Distance (au)           : 17.869
f0 (km)                 :       0.000
g0 (km)                 :       0.000
skyplane vel. (km/s)    :  -5.65
Sun-Target sep (deg)    :  114.61
Sun-Moon sep (deg)      :   84.21
B (ring opening deg)    :   15.74
PA of pole (deg)        :  102.69
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (")  :   1.197
C/A sky separation (km) :  15517.2
NAIF SPICE kernels      : RAJobs_U111+rgf15.spk
URKALLv1.spk
ura111.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.ura111.bsp
ura161.bsp
vgr2.ura161.bsp
peph.ura160.bsp
earthstns_itrf93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
```



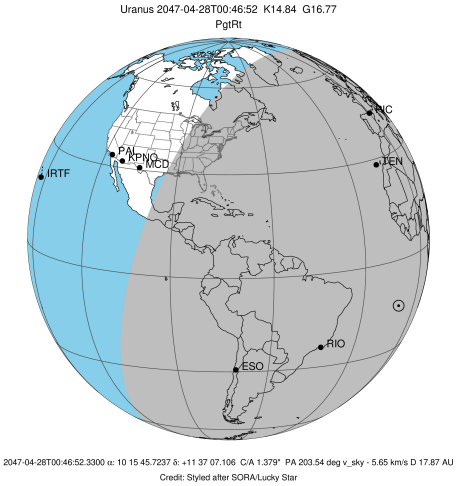



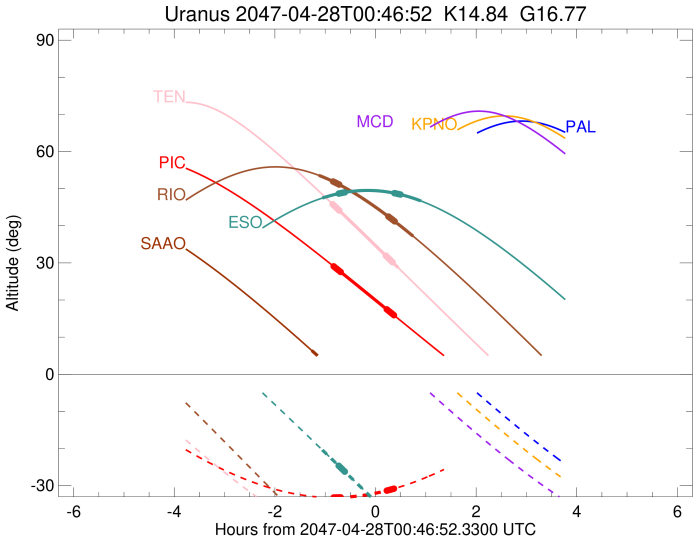

b: ring blocked by planet  x: target alt <  5.0 deg or  sun >  -5.0 deg

| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---|---|---|---|---|---|---|---|---|---|
| epsilon | I | 2047-04-27T23:56:02.960 | b | 51.96 | -47.90 | 51507.45 | -21.25 | | |
| lambda | I | 2047-04-27T23:57:12.846 | b | 51.83 | -48.17 | 50026.71 | -21.15 | | |
| delta | I | 2047-04-27T23:58:34.619 | b | 51.68 | -48.48 | 48300.35 | -21.07 | | |
| gamma | I | 2047-04-27T23:59:06.891 | b | 51.62 | -48.60 | 47621.04 | -21.03 | | |
| eta | I | 2047-04-27T23:59:28.058 | b | 51.58 | -48.68 | 47176.12 | -21.01 | | |
| beta | I | 2047-04-28T00:00:41.428 | b | 51.44 | -48.97 | 45643.96 | -20.92 | | |
| alpha | I | 2047-04-28T00:01:25.160 | b | 51.36 | -49.13 | 44742.97 | -20.86 | | |
| 4 | I | 2047-04-28T00:03:13.316 | b | 51.15 | -49.55 | 42550.40 | -20.73 | | |
| 5 | I | 2047-04-28T00:03:19.836 | b | 51.13 | -49.57 | 42314.45 | -20.65 | | |
| 6 | I | 2047-04-28T00:03:51.019 | b | 51.07 | -49.69 | 41813.48 | -20.68 | | |
| Uranus | I | 2047-04-27T23:39:12.105 | | 53.59 | -44.02 | 25534.48 | | -46.81 | -48.12 |
| Uranus | E | 2047-04-28T01:31:45.639 | | 37.19 | -69.46 | 25529.76 | | 52.79 | 54.04 |
| 6 | E | 2047-04-28T01:02:08.434 | b | 42.51 | -62.95 | 41829.91 | 20.44 | | |
| 5 | E | 2047-04-28T01:02:32.327 | b | 42.44 | -63.04 | 42184.97 | 20.40 | | |
| 4 | E | 2047-04-28T01:02:41.691 | b | 42.41 | -63.08 | 42558.93 | 20.49 | | |
| alpha | E | 2047-04-28T01:04:29.187 | b | 42.10 | -63.48 | 44684.66 | 20.60 | | |
| beta | E | 2047-04-28T01:05:15.801 | b | 41.97 | -63.65 | 45667.62 | 20.65 | | |
| eta | E | 2047-04-28T01:06:29.307 | b | 41.76 | -63.92 | 47176.12 | 20.73 | | |
| gamma | E | 2047-04-28T01:06:51.239 | b | 41.70 | -64.01 | 47630.95 | 20.75 | | |
| delta | E | 2047-04-28T01:07:23.477 | b | 41.60 | -64.13 | 48300.35 | 20.78 | | |
| lambda | E | 2047-04-28T01:08:46.409 | b | 41.36 | -64.43 | 50026.71 | 20.85 | | |
| epsilon | E | 2047-04-28T01:09:31.353 | b | 41.23 | -64.60 | 50964.74 | 20.94 | | |

Uranus_2047-04-28T00_46_52.3300_ESO.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:36:30 2023

```
target                  : Uranus
target radius (km)      :  25559.00
C/A epoch               : 2047-04-28T00:42:01.380
Event type              : PgtRt
: Uranus occs: geocentric, topocentric
: Ring occs: topocentric, not geoecetric
Observer code           : ESO
Location                : European Southern Obs. (3.6m)
Latitude (deg)          : -29.26097
E. Longitude (deg)      : 289.26831
Altitude (km)           :   2.400
Gaia source ID          : 3880562463003595648
2Mass ID (if available) : 10154570+1137071
ICRS Star Coord at Epoch: 10h 15m 45.72369s +11:37:07.10595s
RUWE (>1.4 is poor)     :   0.97
K magnitude             : 14.839
G magnitude             : 16.765
RP magnitude            : 16.138
BP magnitude            : 17.221
DUPflag                 : 0
Distance (au)           : 17.869
f0 (km)                 :       0.000
g0 (km)                 :       0.000
skyplane vel. (km/s)    :  -5.65
Sun-Target sep (deg)    :  114.61
Sun-Moon sep (deg)      :   84.22
B (ring opening deg)    :   15.74
PA of pole (deg)        :  102.69
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (")  :   1.087
C/A sky separation (km) :  14091.5
NAIF SPICE kernels      : RAJobs_U111+rgf15.spk
URKALLv1.spk
ura111.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.ura111.bsp
ura161.bsp
vgr2.ura161.bsp
peph.ura160.bsp
earthstns_itrf93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
```



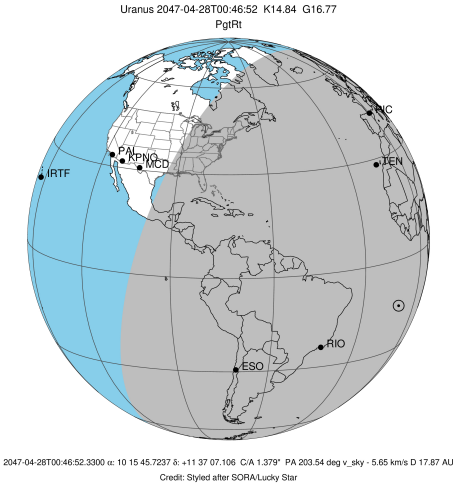



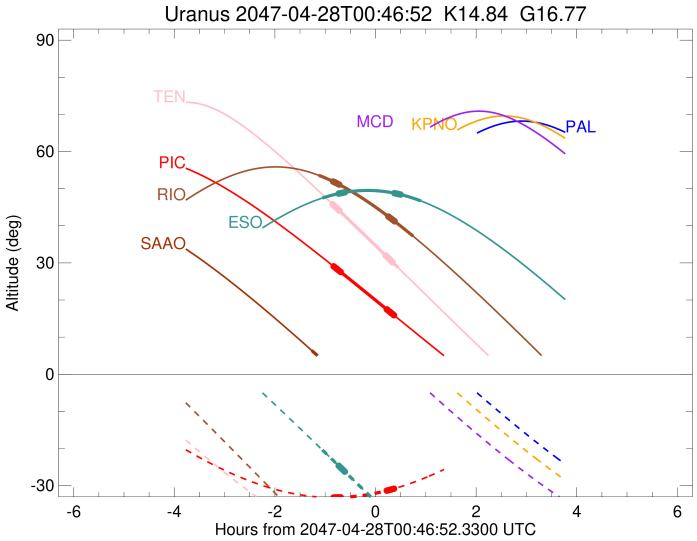

b: ring blocked by planet  x: target alt <  5.0 deg or  sun >  -5.0 deg

| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---|---|---|---|---|---|---|---|---|---|
| epsilon | I | 2047-04-28T00:02:44.251 | b | 48.66 | -24.59 | 51502.03 | -21.42 | | |
| lambda | I | 2047-04-28T00:03:53.279 | b | 48.72 | -24.84 | 50026.71 | -21.35 | | |
| delta | I | 2047-04-28T00:05:14.278 | b | 48.78 | -25.14 | 48300.35 | -21.28 | | |
| gamma | I | 2047-04-28T00:05:46.223 | b | 48.81 | -25.25 | 47621.01 | -21.25 | | |
| eta | I | 2047-04-28T00:06:07.168 | b | 48.82 | -25.33 | 47176.12 | -21.23 | | |
| beta | I | 2047-04-28T00:07:19.731 | b | 48.87 | -25.59 | 45644.29 | -21.16 | | |
| alpha | I | 2047-04-28T00:08:02.860 | b | 48.90 | -25.75 | 44743.72 | -21.11 | | |
| 4 | I | 2047-04-28T00:09:49.710 | b | 48.98 | -26.14 | 42551.80 | -21.03 | | |
| 5 | I | 2047-04-28T00:09:55.906 | b | 48.98 | -26.16 | 42314.01 | -20.94 | | |
| 6 | I | 2047-04-28T00:10:26.721 | b | 49.00 | -26.27 | 41814.73 | -20.98 | | |
| | | | | | | | | | |
| Uranus | I | 2047-04-27T23:43:24.486 | | 47.47 | -20.38 | 25531.87 | | -50.09 | -51.37 |
| Uranus | E | 2047-04-28T01:40:53.812 | | 46.70 | -45.97 | 25527.00 | | 56.43 | 57.62 |
| | | | | | | | | | |
| 6 | E | 2047-04-28T01:09:15.651 | b | 48.79 | -39.11 | 41831.48 | 20.90 | | |
| 5 | E | 2047-04-28T01:09:39.048 | b | 48.78 | -39.20 | 42182.69 | 20.85 | | |
| 4 | E | 2047-04-28T01:09:48.370 | b | 48.77 | -39.23 | 42560.54 | 20.94 | | |
| alpha | E | 2047-04-28T01:11:33.587 | b | 48.69 | -39.61 | 44684.74 | 21.02 | | |
| beta | E | 2047-04-28T01:12:19.356 | b | 48.65 | -39.78 | 45668.26 | 21.07 | | |
| eta | E | 2047-04-28T01:13:31.393 | b | 48.59 | -40.04 | 47176.12 | 21.13 | | |
| gamma | E | 2047-04-28T01:13:52.910 | b | 48.57 | -40.12 | 47631.03 | 21.15 | | |
| delta | E | 2047-04-28T01:14:24.534 | b | 48.54 | -40.23 | 48300.35 | 21.18 | | |
| lambda | E | 2047-04-28T01:15:45.929 | b | 48.47 | -40.53 | 50026.71 | 21.24 | | |
| epsilon | E | 2047-04-28T01:16:29.553 | b | 48.43 | -40.69 | 50953.97 | 21.31 | | |

Uranus_2047-04-28T00_46_52.3300_SAAO.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:40:50 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2047-04-28T00:28:05.160
Event type : PgtRt
: Uranus occs: geocentric, topocentric
: Ring occs: topocentric, not geoecetric
Observer code : SAAO
Location : So. Afr. Astro. Obs. (Sutherland)
Latitude (deg) : -32.37953
E. Longitude (deg) : 20.81070
Altitude (km) : 1.768
Gaia source ID : 3880562463003595648
2Mass ID (if available) : 10154570+1137071
ICRS Star Coord at Epoch: 10h 15m 45.72369s +11:37:07.10595s
RUWE (>1.4 is poor) : 0.97
K magnitude : 14.839
G magnitude : 16.765
RP magnitude : 16.138
BP magnitude : 17.221
DUPflag : 0
Distance (au) : 17.869
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : -5.65
Sun-Target sep (deg) : 114.61
Sun-Moon sep (deg) : 83.47
B (ring opening deg) : 15.74
PA of pole (deg) : 102.69
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.268
C/A sky separation (km) : 16437.8
NAIF SPICE kernels : RAJobs_U111+rgf15.spk
URKALLv1.spk
ura111.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.ura111.bsp
ura161.bsp
vgr2.ura161.bsp
peph.ura160.bsp
earthstns_itrf93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk




b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---|---|---|---|---|---|---|---|---|---|
| epsilon | I | 2047-04-27T23:46:05.467 | b | 3.31x | -65.55 | 51511.56 | -19.95 | | |
| lambda | I | 2047-04-27T23:47:20.123 | b | 3.05x | -65.35 | 50026.71 | -19.85 | | |
| delta | I | 2047-04-27T23:48:47.301 | b | 2.75x | -65.13 | 48300.35 | -19.75 | | |
| gamma | I | 2047-04-27T23:49:21.725 | b | 2.64x | -65.04 | 47621.06 | -19.71 | | |
| eta | I | 2047-04-27T23:49:44.313 | b | 2.56x | -64.98 | 47176.12 | -19.68 | | |
| beta | I | 2047-04-27T23:51:02.640 | b | 2.29x | -64.78 | 45643.71 | -19.59 | | |
| alpha | I | 2047-04-27T23:51:49.432 | b | 2.13x | -64.65 | 44742.37 | -19.52 | | |
| 4 | I | 2047-04-27T23:53:45.011 | b | 1.74x | -64.34 | 42549.34 | -19.37 | | |
| 5 | I | 2047-04-27T23:53:52.191 | b | 1.71x | -64.32 | 42314.73 | -19.29 | | |
| 6 | I | 2047-04-27T23:54:25.495 | b | 1.60x | -64.23 | 41812.53 | -19.31 | | |
| Uranus | I | 2047-04-27T23:30:45.612 | | 6.42 | -67.73 | 25536.82 | | -43.90 | -45.22 |
| Uranus | E | 2047-04-28T01:26:34.465 | | -17.70x | -46.81 | 25531.02 | | 51.17 | 52.44 |
| 6 | E | 2047-04-28T00:55:56.235 | b | -11.22x | -52.98 | 41829.06 | 18.90 | | |
| 5 | E | 2047-04-28T00:56:22.051 | b | -11.31x | -52.90 | 42186.24 | 18.87 | | |
| 4 | E | 2047-04-28T00:56:32.093 | b | -11.35x | -52.87 | 42558.07 | 18.95 | | |
| alpha | E | 2047-04-28T00:58:28.288 | b | -11.76x | -52.48 | 44684.63 | 19.06 | | |
| beta | E | 2047-04-28T00:59:18.588 | b | -11.93x | -52.32 | 45667.28 | 19.12 | | |
| eta | E | 2047-04-28T01:00:37.979 | b | -12.21x | -52.05 | 47176.12 | 19.20 | | |
| gamma | E | 2047-04-28T01:01:01.654 | b | -12.30x | -51.97 | 47630.90 | 19.22 | | |
| delta | E | 2047-04-28T01:01:36.454 | b | -12.42x | -51.86 | 48300.35 | 19.25 | | |
| lambda | E | 2047-04-28T01:03:05.946 | b | -12.73x | -51.56 | 50026.71 | 19.33 | | |
| epsilon | E | 2047-04-28T01:03:54.723 | b | -12.90x | -51.40 | 50970.35 | 19.41 | | |